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SCHOOL HYGIENE.

A LECTURE

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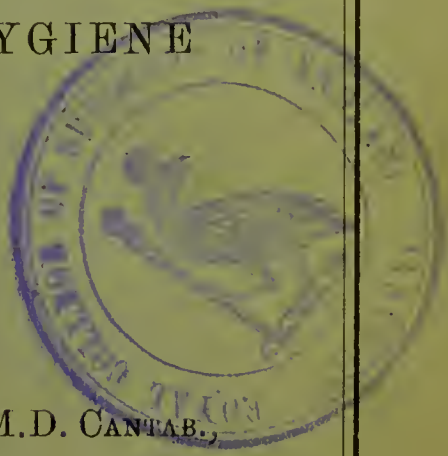
PARKES MUSEUM OF HYGIENE

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BY

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SCHOOL HYGIENE.

At no epoch in the life of the individual is the necessity for hygienic supervision so imperatively demanded as during the earlier years, when the vital processes are most active, and consequently are more readily influenced by external circumstances for good or evil. Even if our object were only to secure in the highest possible degree the bodily health and physical development of those passing from childhood, through youth, to the confirmed vigour of manhood, the questions involved would be of the highest interest and importance. But hygiene in its widest and fullest sense lays down rules for the culture of the mind as well as for the body, since, as Professor Parkes well observes, it is impossible to dissociate the two; for whilst the body is affected by every mental and moral action, the mind is profoundly influenced by bodily conditions. Thus for a perfect system of hygiene we must combine, he says, the knowledge of the physician, the schoolmaster, and priest in order to train the body, the intellect, and the moral soul in a perfect and balanced order. If we take this view of hygiene, as signifying rules for the most perfect culture of both mind and body, the subject imposes on us not only wider interests but deeper responsibilities.

Within the last forty years the conditions of schoolboy life have undoubtedly improved, the range of education has been extended, more attention is paid to general culture and moral training, and in the domestic arrangements there is more elegance and comfort than was formerly the case. But whilst fully admitting the extent of these improved conditions, and the benefit that has resulted from them, as evidenced by the higher tone of schoolboy life, still we must recognise the fact that many circumstances have arisen which constantly tend to

lower the standard of vigorous life at our large educational establishments. In the first place it must not be overlooked that within the last forty years the system of competitive examination has come into operation, and, as it is regarded as the surest test of individual capacity, it has multiplied in all directions and increased in severity. It is not within the scope of the present lecture to discuss the merits and demerits of the competitive system; for while no better scheme could have been devised by which a career, previously closed, except to a favoured few, could be opened to all possessed of abilities and perseverance, yet it has the disadvantage of inducing considerable strain and undue intellectual excitement at an age when the growing frame is making vast demands upon the vital energies. Under the old system education consisted in steady training, and the patient laying of solid foundations, whilst the struggle for pre-eminence was deferred for the university career, or for those who passed directly from school to the avocations of life, at a time when the active period of growth has considerably diminished. Thus a boy between the age of thirteen and sixteen increases 6·86 inches in height, and 36·86 pounds in weight; the youth between sixteen and nineteen only grows 3·35 inches and increases 24 pounds in weight.* Now, however, with the extension of the competitive system to entrance scholarships at schools, a boy, before he is well out of the nursery, is put in harness and driven along certain grooves in order to snatch a premature success, which if attained only commits him more firmly to the forcing system. In making these observations there is no desire to cast reflection on the teaching of the present day, which is as earnest and thorough as can be desired. But they are advanced with a view of pointing out that the conditions of school-boy life have altered considerably, and that instead of a natural evolution of the intellectual and physical powers at this critical epoch of development we have a process of forced culture, a keen competition between the body and the mind for their respective share of vital energy necessary for their growth, with a consequent withdrawal of much of that reserve which should be then stored up in order to bear successfully the struggles and vicissitudes of adult life. Again, owing to the general increase of wealth among the professional and commercial classes, a larger proportion of town-bred boys now find

* These figures are taken from a paper by Mr. C. Roberts, "On the Physical Development and Proportions of the Human Body," 'St. George's Hospital Reports,' vol. viii.

their way annually to our large public schools, and these, reared as they are in large cities, undoubtedly during the early period of their school life help to depress the general average of school vitality. Nor must the fact be overlooked that owing to the wear and tear caused by the "excesses of civilisation," both with respect to professional and social life, and to the later age at which marriage is now entered upon, the offspring of the present generation, which has not yet availed itself fully of the restorative and protective influences hygiene has to offer, do not probably enjoy the same physical vigour the parents possessed at the same age.

It will thus be seen that hand in hand with definite improvements conditions have arisen which have had considerable influence in affecting the health and the physical growth and development of the schoolboy. These conditions, however, have to be accepted, and the question arises not merely how to avert possible evils, but to endeavour by increased attention to hygienic details so to raise the standard of vitality, that the boys of the present generation may become the fathers of that great race which poets and philosophers tell us is to be.

With these introductory remarks we pass on to the practical consideration of the subject of the lecture, which may be conveniently referred to three heads :

1. The relation of the school to the town with respect to drainage, water supply, and the introduction of infectious disease.
2. The general sanitary arrangements of studies, dormitories, lavatories, &c., and the means employed to prevent the spread of epidemics and to secure the isolation of cases.
3. Special hygienic conditions, as affecting the individual boy, with regard to diet, hours of work, and general capacity for mental and physical exertion.

At most of the older public schools we find that the idea of isolation at the time of their foundation must have been adopted. Thus Eton was separated from the town of Windsor by the River Thames, the growth of the township of Eton being of a date subsequent to the foundation of the college. At Winchester the cathedral and close intervened between the college and the town. Harrow was a mere hamlet when the school was founded, but its school buildings were

clustered on the edge of the hill, so that even now with the growth of the place they are hardly encroached upon by the ordinary dwelling-houses.

It is, however, a difficult matter to secure complete isolation from the town; still the general principle should be adopted. Whenever it is possible a separate system of drainage should be secured, or, if this is not possible, either to adopt the system of earth closets or else completely to defend the premises against any possible entrance from without of deleterious emanations from the town sewers by a series of effective and well-ventilated traps. Too much importance cannot be attached to this point. Young persons are more susceptible to the poisonous influence of sewer gas than adults, and though it may not be intense enough or specifically charged with typhoid germs to produce an epidemic, its long-continued action is nearly as subtle and as fatal. My attention was not long ago called to an instance where three boys, who had successively occupied the same bed, were attacked with the same kind of illness, a low form of pneumonia, the general health of the school being at the time exceptionally good. On searching for the cause we found that the trap of the waste pipe connected with a large basin near the bed was defective, and that the waste pipe entered directly into the house drains. These boys had, therefore been sleeping in an atmosphere of sewer gas. My friend Dr. Poore has also given me the notes of a very similar instance, occurring in one of our leading public schools, in a house recently constructed and apparently fitted with all the best modern sanitary appliances. Although it is still an open question whether sewer gas *per se* will lead to outbreaks of diphtheria, continued fever, &c., still there can be no doubt that whenever it is allowed to diffuse itself in the neighbourhood of inhabited dwellings, a low state of health is the result, and that when zymotic disease is prevalent its malignancy is greatly determined by this circumstance. It cannot be too much insisted on that the house drains, if the system of water carriage be adopted, should not pass under the basement of the school buildings, and that all privies, closets, &c., should be detached from the main block of buildings.

All sanitary repairs should be undertaken during vacation time. The neglect of this rule has led to many disasters. Murchison has recorded some fatal cases of blood-poisoning among the inmates of a school at Clapham, following the cleaning out of a small cesspool in the vicinity of the playground. And it was in the investigation of a

similar occurrence at Wandsworth that Dr. Anstie received the fatal poison which deprived the profession of an able and accomplished physician, and robbed sanitary science of one of her most indefatigable workers and enterprising pioneers. In a more recent case, in a small industrial school in the neighbourhood of London, the cleaning out of the latrines was followed by the illness of many of the inmates, who, on the day following, were seized with violent vomiting, acute abdominal pain, and severe fever, which lasted for some days. So sudden and violent was the attack, and so many were affected, that it was suspected that poison had been introduced with the food, and the real cause for a time overlooked.

Equally important is the question of the water supply. Wherever practical an independent water supply should be secured. Many schools have been able to do this. Thus, Marlborough has been especially fortunate in securing a deep well sunk in chalk, and so situate that it is impossible for the supply to be contaminated at its source, whilst the arrangement of the drainage precludes the possibility of its becoming contaminated during its distribution. In fact a study of the arrangements of this school with respect to the drainage and water supply may be recommended to those who are desirous of effecting improvements on their own premises.* If a well is sunk on the school premises it must, however, be at greatest possible distance from the school drains or cesspools, especially in loose porous soils, or on the chalk where fissures are likely to occur. I need hardly remind you of the disastrous outbreak of typhoid fever which occurred at Uppingham only a few years since owing to the specifically infected excreta of one of the boys passing from the cesspool to a well closely adjacent. In this case the master's house, in which the outbreak originated, had been recently constructed, and on the best possible principles, apparently leaving little to be desired in point of sanitary arrangements, and it was not till a considerable period had elapsed and the disorder had spread to other houses, and the school removed to other quarters, that a searching investigation revealed the fact that a drain leading from one cesspool to another, a little distance from it, had been brought in close contiguity with the well. The discovery at once led the school authorities to seek for an unimpeachable water supply to secure themselves against any possible repetition of the disaster, but the lesson so

* Vide "Report of 'Lancet' Sanitary Commission," 'Lancet,' vol. ii, p. 314, 1875.

emphatically conveyed ought not to be disregarded by others who may be reposing in false security till some day a boy, returning home from the holidays, may bring the seeds of the disease with him and spread it in like manner among his companions. When, however, the school has to depend on the general supply of the town, some member of the school authorities should be on the Board of the Water Company, to insist on the purity of the supply as taken from its source, and also to see no possible contamination occurs in its delivery, especially when the supply is intermittent, or a constant supply may be temporarily so. The outbreaks of typhoid fever at Lewes, Over Darwen, and Croydon, have shown how readily sewage matters can be sucked in into the water pipes when there is any defect in the laying of these. If any suspicion exists as to the purity of the town water, it is advisable to secure a supply for drinking purposes from some spring a little distance in the country, carefully shielded from all possible contamination, and convey the water daily by means of water-carts to the school premises. Many schools have been obliged to adopt this method of securing an absolutely pure supply of potable water. In all cases the water required for sanitary purposes should be conveyed by a service of cisterns and pipes absolutely distinct from those used for the water supplied for domestic purposes. It was through neglect of this precaution that typhoid fever was accidentally introduced to the new buildings of Caius College in 1874.

But diseases originating in the town can be introduced in other ways besides through the medium of the sewers, or by specifically contaminated water, and that chiefly by direct intercourse with the townspeople. This should be lessened in every possible degree, and at times when epidemic diseases are prevalent should be entirely stopped, and the boys kept within the school precincts. In schools where there are a large proportion of day scholars, coming from different parts of the town, arrangements should be promptly made when scarlet fever makes its appearance in an epidemic form to conduct the studies of the boarders for a time apart from those of the day boys. Either by devoting one part of the school premises to their entire and separate use, or, better still, hiring some large room, or house, for their accommodation. The trouble, expense, as well as the dislocation of studies this occasions, would be amply repaid; for even if it did not succeed in checking the extension of the disease, it would diminish the intensity of the epidemic, which even in the presence of admirable sanitary

arrangements, shows a tendency to severity directly proportionate to the number of persons exposed simultaneously to its influence. For the same reason Board, National, and Sunday Schools should be promptly closed when scarlet fever is actively prevalent in the districts in which they are situate. And this leads us to the consideration of the best means to be employed to prevent the spread of epidemics and secure the isolation of cases. Here early intimation is of the utmost importance if measures of isolation are to prove effective, and for this purpose the clinical thermometer is of the utmost service, since all the exanthematous diseases, scarlet fever, measles, smallpox, &c., are ushered in by a distinct rise of the bodily temperature, reaching its maximum with the development of the characteristic rash. Thus if the temperature be taken on the first declaration of malaise, and from time to time for some hours afterwards, we arrive at a very fair idea as to the probable nature of the case at the very outset. The temperature should be taken, as a matter of routine, in the case of every boy complaining of illness however slight, and then if it were found to be above 99.5° F. he should be isolated till seen by the school doctor. By this means if the disease prove infectious much valuable time has been gained, and if it happens, as is often the case, that the sufferer is the importer of the disease, it may be hoped that this immediate isolation will prevent the development of the disease. But whether the thermometer be used by the lay authorities or not, it is utterly unjustifiable to allow a boy complaining of sickness or malaise to remain with his companions; he should be isolated till the medical attendant has seen him. This precautionary measure is too frequently neglected, in households as well as schools. A boy complains some afternoon or evening of headache, weariness, nothing apparently serious, certainly no fever, that is, he is not hot to the touch, on the contrary, he complains rather of being chilly. It is thought a good night's rest will do him good, so he is sent early to bed to his usual dormitory. The next morning he is found feverish and restless, and the doctor is asked to see him, finds him with a high temperature and declares the invasion of scarlet fever. So for a period of some eight or ten hours this boy, attacked by one of the most contagious, in all its stages, of zymotic diseases, has been infecting the air of the common dormitory. All schools, therefore, should have a spare room containing a few beds, for the reception of cases of sickness till seen and reported on by the medical attendant. If the case should prove

an ordinary one the boy can remain where he is, but if it should prove of an infectious nature he must be at once removed to the sanatorium, which ought to be devoted entirely to the reception of infectious cases. By the prompt isolation of each case as it arises, it is possible to stamp out even an outbreak which has many independent centres of origin. The question of the dispersion of a school when an outbreak of scarlet fever occurs often arises. When this question is put, surprise is often expressed at not being able to get a clear and definite reply to the counter question, How many boys are there who have had the disease previously? This, of course, is a very important consideration and yet is hardly ever attended to, and the boys, in the majority of instances, have to be brought together then and there and questioned with regard to their medical antecedents, and the answers thus obtained are generally of very doubtful value. There should, therefore, be a distinct rule at every school that a boy on entering should bring with him a certificate signed by his ordinary medical attendant stating what acute illness he has had, with other particulars to which allusion will be made further on. Then at a glance we are able to judge what can be the possible extent of the epidemic with which we have to deal. Having ascertained this point, inquiry must be made into the extent of accommodation at the sanatorium and the completeness of means in existence to ensure perfect isolation. Then if there are a fair proportion of protected cases, ample accommodation at the sanatorium, and the arrangements for isolation perfect, I think the public interest is best consulted by keeping the school together, and I think we are still more justified in coming to this conclusion if the epidemic is not of a severe type, and if several boys have been attacked almost simultaneously at the outset, and no fresh cases have occurred for some twenty-four to forty hours. If, however, the outbreak has commenced with only a few isolated cases, and continues to occur at irregular intervals, it will be necessary to dismiss the school, since there is evidence that the disease is either being still introduced from without into the school, or that the means of isolation are not effective. In dismissing a school under these circumstances I need hardly point out how necessary it is to allow the parents sufficient time to make arrangements. If there are other children it would be manifestly wrong to allow the boy on his return to associate with these, and therefore arrangements have to be made for their separate disposal. These arrangements cannot always be made at a moment's

notice. Before the boys are dispatched to their homes all articles of clothing should be thoroughly disinfected.

So far we have been considering scarlet fever and diseases of like type, which are conveyed by actual contact as well as by infection through the air, it remains now to say a few words with regard to typhoid fever, whose chief, if not sole, means of conveyance to the system is by the medium of specially infected water. Isolated cases of this disease are by no means infrequent at schools, boys bringing the seeds of the disease with them, contracted at some small watering place, or some continental town, where the holidays have been passed. If, however, the sanitary arrangements of the school are perfect the disease will not spread. When a number of boys, however, are seized at once it is a sign that the fatal dose has been obtained whilst at school. There are many ways in which this can happen, and the commonest is of thirsty boys drinking impure water outside the precincts of the school when engaged in country excursions. This was the cause of the outbreak of typhoid fever at Müller's Orphanage, Clifton, 1875. The children drunk from some water courses on the downs which received the drainage from some newly-constructed houses. Aerated drinks, as lemonade, gingerade, &c., especially those manufactured in small towns where surface well water is used, are frequently dilute solutions of sewage matter, and therefore become apt vehicles for the conveyance of infection when the disease is imported into the district. Milk, too, is another medium by which both typhoid and scarlet fever can be conveyed. When speaking of the diet and food of schools we shall recur to this point, and urge the necessity of a strict supervision being exercised over all extraneous articles of diet, both with regard to manufacture as well as sale. When an extensive outbreak of typhoid fever occurs the first point is to determine the source of infection. If this can be done at once, and we are sure that we can stop any further supply of the poison, and are certain that the sanitary arrangements of the school are perfect, then there will be no reason to break up the school. If, on the other hand, the slightest doubt exists as to the origin of the outbreak the school must be dismissed forthwith however excellent the sanitary arrangements may be.

With regard to the domestic arrangements of the school premises these vary considerably at different schools; but we generally find a large schoolroom, where lessons are repeated and sometimes learnt,

class-rooms where special subjects are taught, a dining-hall for meals, if the boys are not living with masters in separate boarding-houses, a block of buildings containing dormitories and studies, out-houses for closets and urinals, and the playground furnished with fives and racket courts, and in most cases with a swimming-bath and gymnasium. The chief points to be attended to are : the thorough dryness of the foundations and sound construction of the fabric, the allotment of sufficient cubic space, especially in the class-rooms and dormitories, the adoption of a satisfactory system of ventilation and lighting. Since these points belong purely to technical hygiene, and have, most of them, been already treated in preceding lectures of this course, it will only be necessary to touch briefly on some of the more important points. Thus, for instance, with regard to the size of dormitories, we have to choose between the adoption of large wards containing from thirty to forty inmates, medium-sized dormitories, or the system of a separate dormitory combined with a study for each boy. The large dormitory system has the disadvantage that if scarlet fever be introduced into a school there is greater chance of its spreading among boys susceptible to its influence. Again, the study and dormitory combined is wrong in principle, the sleeping-room and working-room should always be kept distinct ; more labour is required to keep these rooms sweet and clean, and they necessitate strict supervision on the part of the masters. The medium-sized dormitory, containing from fourteen to sixteen inmates, on the other hand, is more manageable, both as regards sanitary as well as moral supervision. The practice of placing partitions between the beds—the cubicle system—is to my mind objectionable ; they interfere with the free circulation of air, and solitary vice can be practised without fear of detection. For checking this pernicious habit there is nothing more effective than publicity. The cubic capacity for each inmate in the dormitory should not be below 700 cubic feet, whilst arrangements should be made for the removal of impure air and the introduction of fresh (warmed in winter). The same amount of cubic space is not required in the class-rooms and studies as in the dormitories, since a much shorter time is spent in them, and windows, &c., can be opened at the termination of each period of occupation which seldom exceeds two hours. But even here the allowance should not be below 400 cubic feet, and even then an efficient system of ventilation is required if the health of the inmates is to be maintained. With regard to the system of ventilation

to be adopted, much depends on the arrangement of the school buildings, and the size of the class-rooms. When these are large and are built on the same level, the foul air is best extracted from the basement of the rooms by means of machinery, whilst fresh air (warm in winter) is introduced by means of shafts entering at the upper level of the apartment. But when the studies and class-rooms are small and numerous, and the buildings are of considerable height, this mode of ventilation is hardly so effective, and its adoption involves considerable expense. In these cases, for the ventilation and warming of the smaller rooms, it is best to rely on the fire-grate, arranged on the system devised originally by Captain Galton by which fresh air introduced from without is warmed in a chamber behind the grate and then distributed by means of pipes round the room. The lighting of studies and class-rooms is of the utmost importance. On the Continent the number of short-sighted youths is something astonishing. In England the evil, though not so great, is still apparently on the increase, and we owe much to Mr. Brudenell Carter for his labours in detecting the various causes, among which ill-arranged and insufficient lighting is an important element in inducing the condition, and also for his suggestions for their removal, and to whose work I would refer all interested in this subject. Whatever system of lighting is adopted, care should be taken to carry off the products of combustion and to see that the light is so arranged when the boys are writing, that it is placed on the left side, so that shadow of the writer's hand and pen falls away from the paper. The school premises should be kept scrupulously clean, and all latrines thoroughly scoured down by means of powerful hoses at least twice a day. Every waste, overflow, and rain-water pipe should be disconnected from the drains and discharged over thoroughly well-trapped gratings, which should be constantly attended to.

The details we have considered refer to the school as a community and the precautions necessary to ensure the general health, we have now in the concluding portion of the lecture to touch upon points that affect the individual school boy. Among them, the first in importance is the question of diet. In constructing a dietary several important conditions have to be taken into consideration. First with regard to the age. From ten to fourteen the annual rate of growth is steadily progressive, except between thirteen and fourteen when there is a slight check, as if nature herself paused to collect some reserve of energy before crossing the threshold of adolescence. That once passed,

a great start in growth at once takes place, progressing annually until it reaches its maximum between the age of sixteen and seventeen. It is obvious, therefore, that the amount and nature of the food must bear some relation to the requirements of growth and development. Care must be taken that while supplying the needs of the growing frame we do not overburden the organs of assimilation. For if these are called upon unduly to provide their secretions in sufficient quantity to reduce the excess of food, so much available force is withdrawn from the body and the processes of nutrition are interfered with. On the other hand, anything like limitation in the requisite amount is positively injurious. Then, again, as regards the nature of the chief constituents of the diet, observation tells us that at different ages we have instinctive aptitudes for various food constituents. Thus children and young people crave for, and can take, considerable quantities of sugar without ill results, whilst, as a rule, they dislike fat, and this dislike is not altogether fanciful, since it is a matter of common observation that rich foods often disagree with children when purely saccharine food can be taken in large quantities with impunity. Adults, on the other hand, as a rule, find sugar turn "acid" and fat makes them "bilious," and desire an animalised diet, which, in spite of what vegetarians may say, seems best adapted as a diet for those on whom sudden calls for intense mental or physical activity are repeatedly demanded. Thus Professor Haughton has pointed out that athletes, race horses, and animals who spring upon their prey are flesh or grain eaters; whilst beasts of burden, whose work is slow and continuous, instinctively prefer the saccharine and starchy elements of food, as contained in fodder, beans, and roots. Old persons, again, return in one respect to their childhood in their desire for sugar and the comparative impunity with which they seem able to indulge their taste, whilst fatty foods usually agree, indeed, seem to be demanded to maintain the failing calorific powers, whilst the capability of assimilating animal food steadily wanes.

Nature also gives us another lesson, which should teach us to vary our diet with the progress that takes place in development, in the changes that occur in the chemical composition of the mother's milk from the birth of the infant to the period of the first dentition. For whilst the milk-sugar at first is relatively in excess of the casein or albuminous constituents, it diminishes during the progress of lactation, whilst the casein slightly increases in amount.

Next in importance to the amount and nature of the food, comes the question of the meal hours. With young persons, as well as with the aged, long intervals between the meals should be avoided. Formerly, at many schools, and it may be the practice of some now, for no food to be administered from the substantial tea at six or seven o'clock in the evening, till breakfast the next morning at eight o'clock. Thirteen to fourteen hours constitute too long an interval to keep the growing frame without food, especially as some hours of study follow the tea hour, and an hour is generally spent in the schoolroom before breakfast is served. In all cases a light supper of bread and cheese should be served out the last thing before retiring to rest, and a crust of bread or a draught of milk given to each boy on leaving the dormitory in the morning, especially if any work has to be done before breakfast. This and dinner should be the two substantial meals of the day, and in the case of the older boys, who have meat twice a day, the extra allowance of meat should be given at breakfast and not at the later meals of tea or supper. For the younger boys honey, marmalade, or any kind of preserved fruit should be served with the breakfast in lieu of meat. The greatest possible attention should be paid to the quality of all food supplied, and in order to insure this all provisions brought to the school should be inspected on delivery by some person connected with the establishment who can have no interest in allowing food of an inferior quality to be palmed off when the best has been contracted for. The necessity for such supervision is recognised by the management of our large hospitals and public institutions, but is too much neglected in our households and private establishments. Such an important matter should not be left to the discretion of the cook or housekeeper. Minute attention should be paid to all the details of cooking the food and serving it. The meat should be dressed so as to retain its juices, and not to increase the value of the cook's perquisites from the dripping pan. There should be such supervision as would render it impossible for the vegetables to be served sodden or the tea made with smoky water. No excuse ought to be accepted for serving food in a tepid or lukewarm state or on cold plates and dishes. Badly cooked and slovenly served food is not only unpalatable but highly indigestible, and in schools where these particulars are not attended to, a low state of health is sure to result. The food too, whilst simple in character, should be as varied as possible, the practice of having certain joints and certain

puddings on stated days is a bad one. Coffee and cocoa should be substituted occasionally for tea, and it is advisable to change the character of the bread supplied from time to time. If these details, which appear trivial, but are in reality so important where healthy nutrition is concerned, were attended to we should have fewer complaints from parents of their boys coming back from school thin and pallid. The instances in which boys are insufficiently fed are, I am convinced, nowadays very rare, but too little attention is paid to seeing that the diet is varied and the food properly cooked and served in a palatable and appetising form. If the boys came fresh from the cricket-field, the river, or the downs, after a morning of active exercise in the open air to their dinner, dried up mutton, chilled greasy gravy, and sloppy vegetables might not take the edge off their appetites, but when they have been engaged all the morning in arduous studies, perhaps in close and stuffy class rooms, the appetite is less keen and the stomach naturally turns against such fare.

Whilst on the question of diet, the practice of allowing boys to spend their money freely on confectionary and other provisions from the town must be emphatically condemned. There is a difficulty in dealing with this question, since no doubt it is felt by many unwise to place too many restrictions on school boys, but the practice should only be permitted subject to strict supervision on the part of the masters. All visits to the "sock" shops should be prohibited before the dinner hour, and supplies when obtained should be consumed at once and not stored up to be devoured at odd times. It is impossible for boys to relish plain wholesome food if their stomachs have been previously pampered with tartlets, cheap ices, sausage rolls, and other trash. At some schools there is an excellent system adopted of having an order book, in which on stated days of the week the boys write down what they require, and the order being counter-signed by one of the masters, the supplies are sent in and served out after one of the meal times. But in addition to this check on the indiscriminate purchase and consumption of school-boy luxuries, attention should be paid to the quality of the provisions supplied. In small towns the water used for making aerated drinks and other beverages is often taken from surface wells, and thus becomes the medium for the conveyance of typhoid fever. Scarlet fever, diphtheria, and typhoid fever may likewise be introduced with the milk. The use of pork of inferior quality in making pork pies and sausage rolls will often cause severe attacks

of diarrhœa, and there is always the danger of tapeworm being engendered by its use. The extraordinary outbreak in the north of England last year occurring among persons supplied with buns from a certain bakery showed how easily substances of a deleterious and poisonous nature can find their way into articles of this kind when carelessly prepared, and the revelations into the sanitary conditions of the lower premises of small confectioners and bakers have warned us that filth of every description may be incorporated with their commodities. For these reasons it is advisable that the premises of these tradesmen should be inspected from time to time by the medical attendant of the school, and also that the quality and mode of preparation of the different articles supplied should be closely scrutinised.

We have now to consider the influence of school work and sports on the health of boys. With regard to the first, I think we often entertain exaggerated ideas as to the evil effects of honest hard work. So long as it is judiciously regulated I believe it is a normal condition, and more ill results follow attempts to shirk or curtail the common obligation than from excessive zeal in this direction. But in order that hard work should not prove hurtful to the growing frame, certain conditions have to be observed. The hours should be so arranged that proper intervals of rest should be allowed to intervene, so that prolonged effort does not lead to fatigue, whilst care should be taken to see that the bodily powers are sufficiently recruited by sleep and good food. The trainer's adage, "distance is nothing, 'tis the pace that kills," should be kept constantly in mind. This is of more importance since the introduction of the competitive system, which has introduced an element of anxiety and excitement into schoolboy life, and which, if given way to, produces untoward results both as regards sound education and the boys' intellectual development. At our large public schools the amount of work required is certainly not excessive, nor is any undue pressure apparently put on the boys, but at many of the smaller schools the system of cramming is unmercifully employed. Such schools, not having the prestige of the older institutions, endeavour to secure public patronage by forcing on candidates for successful competitions in every kind of examination. As a general rule, it may be stated that thirty-five hours of school work a week for boys under fourteen, and forty-two hours for boys above that age may be taken as what may be fairly accomplished. All work should be

finished by nine o'clock, and all the boys should be in bed before ten.

The study of the effect physical education and training has on the development of the body in youth is still very incomplete, and it is much to be regretted that frequent and systematic records are not kept at all our large public schools, noting the height, weight, rate of growth, chest increase, and general development of different parts of the body of each boy, and the influence certain games have in promoting special development. Till such records are available, our knowledge on this subject must be founded largely on conjecture. Still, from a consideration of the fact that development is most active from fourteen to seventeen, I think it is a matter for regret that the system of competitive exercise in the form of "athletic sports" has extended to our schools. It is not merely the evil caused by the struggle of the day, but the strain of preparation carried on for weeks beforehand, and also allowing the boys to enter for too many trials. Sportsmen have protested against the training and racing of two year old colts, as having a tendency to produce subsequent unsoundness and general physical deterioration, and so with growing lads, struggles involving so much strain and excitement are best avoided at this most active developmental period of life. The age when such contests may be undertaken without risk is the period when the activity of growth becomes checked, the age, in fact, when most youths enter at the Universities or begin to engage in the active duties of life. Till then the ordinary school games, cricket, football, &c., afford quite sufficient exercise for the growing lad. A gymnasium is a useful adjunct to the school playground, for though in my opinion no system of artificial exercise can replace the natural movements obtained in pursuit of the usual English pastimes, still gymnastics are extremely useful in strengthening feeble and delicate frames, and for developing certain groups of muscles not brought into prominent action by the ordinary school games. At many of our public schools "Naturalist Field Clubs" have been established, which is a step in the right direction, since they provide a motive for exercise to those who are otherwise debarred by health from joining in the more active pursuits of the playground.

A few words must be said about the difficult and delicate subject of school punishments. There can be little doubt that corporal punishment often has an injurious effect on boys of highly nervous tempera-

ment, and it should always be a matter for reflection what the probable effect may be before resorting to it in any individual case. It ought never to be administered for default in school work, at all events, till the diagnosis between idleness, natural stupidity, or ill health, is made more certain than it is at present. No good, indeed I think positive harm, results from its administration for moral offences, such as habitual lying, stealing, or vicious habits ; these depend, as is now well recognised, upon a naturally inferior, if not actually diseased, nervous organisation, in which the inhibitory or controlling powers are diminished. Punishment in these cases is a positive injustice, and the only means of dealing with these cases is by the exercise of what has been called "common-sense care," that is, by proper regulation of work and passion and habit. Boys, therefore, who develop these tendencies ought not to be allowed to remain at a general school, but should be placed at once under proper supervision and special training. When this is judiciously carried out control is often regained as the mental and nervous organisation develops. The practice of giving impositions for boys to learn or to write out is not to be commended, since it confines the boy to the school-house and prevents his taking proper exercise ; besides this it proves injurious to the eyesight in many cases, since the monotonous strain of copying out or keeping the eye continuously on the page whilst learning by heart fatigues the muscles concerned in adjustment, and thus produces shortsightedness and other ocular defects. At some schools a system of punishment drill has been adopted, and this, as far as health is concerned, is far preferable, and is, I believe, quite as effectual. The only objections I am aware of that have been advanced is that it is expensive, and that it may give a distaste in after life for volunteer drill. The expense, however, of the drill-sergeant could be met by a levy on the boys' pocket-money, whilst the character of the drill need in no way resemble that required in military service. Punishment drill is found to be very effective in the army, and it has this advantage that it cannot be evaded, as may be the case with written impositions, by older boys getting the juniors to do the task for them.

Having reviewed the various circumstances that influence the health of schools, either from insanitary conditions of the neighbourhood in which they are situate, or from defective domestic or sanitary arrangements in the schools themselves, we pass on to a consideration of the nature and extent of the medical supervision that ought to be

exercised over the boys. At the commencement of the lecture I quoted Dr. Parkes's dictum, that for the establishment of a perfect system of hygiene "the knowledge of the physician, the schoolmaster, and priest" must be combined. At our large public schools little is left to be desired in the way of intellectual and moral training, whilst with a few exceptions, the importance of securing constant medical and hygienic supervision is entirely overlooked. When illness occurs the best medical advice is called in, and in the case where a school has been subject to repeated invasions of epidemic disease the opinion is perhaps sought of some one specially skilled in such matters to report on the conditions that lead to such outbreaks and suggest measures for their prevention. But beyond this, constant and systematic supervision is rarely attempted. The necessity for such constant medical supervision has been admitted at some of the leading public schools. Thus Rugby and Marlborough have a medical officer especially attached to them whose duty it is to overlook the sanitary arrangements of the school and make himself acquainted with the habits and constitutions of the boys. It will be hardly necessary for me to mention the names of Dr. Farquharson and Dr. Clement Dukes who have been the successive medical officers at Rugby and Dr. Fergus of Marlborough to recall the excellent work these gentlemen have done in the field of School Hygiene and the important services they have rendered their respective schools. In small schools of course it would be impossible to secure the undivided attention of the ordinary medical attendant, but even in these cases a considerable amount of supervision can be effected by a short daily visit to the school. The chief points that require attention are, I think, first, a thorough knowledge of the boy's medical antecedents. For this purpose the parents should furnish correct information whether the lad has had any contagious disease, and if so of what nature, the date of its occurrence, and whether there is any peculiarity of constitution, such as liability to colds, headache, rheumatism, hernia, &c. On entering the boy should be examined by the school medical attendant, and his name, age, height, weight, chest girth entered with the foregoing particulars, in a register. On leaving school for the vacation he should again be seen by the medical attendant, and the increase in height, weight, and girth carefully recorded. This form of medical inspection is especially called for during the first term of school life, which is generally very trying to lads of delicate constitution. A little extra care at this period often

prevents a break down, and enables a boy to get a fair start in growth and health. A certificate stating the condition of the boy's health during the term should be sent to the parents, who should be obliged to furnish another on the boy's return, stating if the boy has been ill or not during vacation, and if so it should be countersigned by the family attendant certifying the nature of the disease. The boy should be seen again immediately on his return by the school attendant. The advantages to be gained by attention to these details are manifest. Supposing scarlet fever or measles break out in a school, the medical attendant at once learns what boys have had the complaint by looking over his register, and can then judge how many boys there are liable to the disease and make provision accordingly. By examining a boy on his return from the vacation the medical man has a chance of detecting any contagious complaint which may have been overlooked at home, and such oversights are by no means uncommon. The terminal record of a boy's height, weight, and girth would prove invaluable, and the medical attendants of our schools would soon be able to furnish us with important information with regard to development at this epoch of life, besides being able at once to detect any changes of an adverse nature, and by timely treatment to arrest the mischief. Thus, for instance, strumous affection, or even heart disease, may gradually supervene in delicate and rapidly growing boys when exposed to undue strain and excitement. Only an intimate acquaintance with the physical condition of each boy enables the medical attendant to detect the mischief at an early stage and regulate the school life accordingly. But the great advantage of constant medical supervision lays in the fact of being beforehand with epidemics. Year after year great cost and inconvenience are incurred, to say nothing of the danger to the general community, by the breaking up of schools owing to the introduction of zymotic disease. There is a kind of fatuous belief that these epidemics must occur from time to time as a matter of course and have to be patiently endured. But nothing is more erroneous or opposed to the teaching of sanitary science. A generation which has seen the almost complete abolition of typhus fever, by the simple operation of the Common Lodging House Act, ought not to despair of dealing on equal terms with such diseases as scarlet fever, measles, and the like. Improved methods of drainage and land cultivation have removed from us such maladies as ague and dysentery, a better knowledge with regard to our food supplies has

made scurvy, once the scourge of our civil population, as well of our fleets, an unknown disease. The improved methods of treating wounds has rendered operations possible for the relief of human suffering that a few years ago could only be imagined, whilst pyæmia and erysipelas which were formerly regarded as matters of ordinary risk in hospital practice are now looked upon as evidences of sanitary neglect, and of opprobrium to the individual surgeon. With these examples to encourage us, can we doubt of our ability to deal effectually with zymotic disease when it appears in our schools, when the only points required are vigilance to prevent its entrance, prompt recognition of the disease when by accident it has been introduced, and efficient isolation when a case has occurred.

It may be, as Professor Parkes has observed, that in the scheme of Providence it is not meant that man should be altogether healthy. Diseases of the mind and body may be the cross he has to bear, or it may be the evil against which he has to struggle, and whose chains he is finally to unloose, but in spite of all our weaknesses and all our many errors we are certainly gaining knowledge, and that knowledge tells in no doubtful terms, that the fate of man is in his own hands. "It is undoubtedly true that we can, even now, literally choose between health and disease; not, perhaps, always individually, for the sins of our fathers may be visited upon us, or the customs of our life and the chains of our civilisation and social custom may gall us. But as a race man holds his own destiny and can choose between the good and evil, and as time unrolls the scheme of the world, it is not too much to hope that the choice will be for good." Contrast this hopeful language with that of the poet Gray who, whilst regarding the happy sports of youth could only be filled with a sense of sad foreboding and despair.

"Alas, regardless of their doom,
The little victims play."

When the history of the present century comes to be written, the progress towards the moral, and physical regeneration of the race will be its proudest boast, and reckoned its most successful achievement. It can look back on the emancipation of children from the labour and tyranny of the mine, the brickfield, and the factory. It has afforded the means of a sound education for all. Our knowledge of the causes that lead to the outbreak and spread of epidemic disease is so complete that if our means of application were equally advanced

we could effectually control them. And though perhaps the legislation for the moment hesitates to enforce measures that would limit, if not entirely prevent, the extension of that disease which defiles the blood of innocent generations, yet the obstruction will not be for long; the people as they become better informed in questions of hygiene must see the necessity for dealing effectually with this terrible disease. On the other hand, we have to hail with pleasure the extension of temperance among all classes of the community. The greater attention paid everywhere to the ordinary laws of health goes a long way towards counteracting the evil effects produced by the excesses of our civilisation. In the midst of such manifest improvements, it is impossible for us to acquiesce in the conclusion arrived at by the poet at the end of the last century, with regard to the questions we have been considering, and no one would now admit in respect to them that "Where ignorance is bliss 'tis folly to be wise."

